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Trade and Inequality in India

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Abstract

To study the effects of the dramatic economic reforms undertaken in India in the early 1990s on inequality, this paper uses the Theil inequality measure constructed using Indian household expenditure survey data from 1988-2005. Overall inequality shows some variation over the period, rising between 1988 and 1994 and again between 1994 and 2000, but falling by 2005 to roughly the pre-reform level. Furthermore, in the post reform period (between 1994 and 2005), inequality fell in most Indian states, with rural areas in most states and urban areas in about half the states experiencing a statistically significant reduction in inequality. The change in inequality across households within states is found to uncorrelated with the change in state-level measures of tariff and non-tariff protection.

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Trade and Inequality in India

1. Introduction

A central aspect of the public debate over the economic policy reforms undertaken in India in the early 1990s¹ was the anxiety that the greater market orientation of the economy and its openness to international trade would widen the inequality between regions, states, urban and rural areas and households across the country.^{2,3}

Basic international trade theory predicts that trade will increase the returns to the abundant factors in an economy: For the unskilled-labor abundant countries like India, this could be good news—the implication is that trade will raise the incomes of low-skilled workers, thus generating a reduction in poverty and likely in income inequality as well. However, it is sometimes argued that this outcome may not obtain for a number of practical reasons. First, different regions may have different levels of access to international trade—lagging regions may not benefit from trade because transportation and other trade costs may be too high for these regions to interact with international markets. Second, an important source of the gains from trade comes from the improvement in the allocation of productive resources in the economy. However, this improvement in production efficiency may be diminished if factors of production, such as labor and capital labor are not mobile across sectors. Specifically, factors of production that are stuck in declining sectors may be hurt by

¹ For detailed discussion of the post independence history of the Indian economy and the context in which these reforms were eventually undertaken, see Bhagwati (1993) and Panagariya (2008).

² Income inequality here refers simply to differences in incomes. As Kuznets (1953) stated, this is “without regard to their desirability as a system of reward or undesirability as a scheme running counter to some type of equality.” It is important to note, as Atkinson (1983) does, that “in order to assess the implications of differences in income, we need to first establish that the people involved are comparable in other relevant respects” and that “once we have established that people have comparable circumstances, the inferences depend upon the underlying principles of social justice.” Different ideas about social justice can lead to quite different views regarding inequality. Separately, the question of whether trade liberalization (or economic globalization more generally) has benign or malign effects on the distribution of income has been widely debated. See Bhagwati (2004) for a comprehensive discussion.

³ It is, of course, possible that openness to a global economy alters the patterns of income mobility in society as well, a question that we do not study in this paper. See, however, recent work on this interesting topic by Hnatkovska, Lahiri and Paul (2010), Jalan and Murugai (2009) and Munshi and Rosenzweig (2009).

trade liberalization. Third, insights from the literature on economic geography suggest that increases in regional disparities may be a natural feature of the economic development process. Specifically, if production is subject to economies of scale, market forces may induce production to agglomerate in a few areas. In this case, the economic development process can be a lumpy one—with some regions growing faster than others do. Trade itself may affect agglomeration patterns and the location of economic activity. Trade liberalization may lead to an increase in the geographic concentration of economic activity—thus, possibly increasing (or decreasing) the extent of regional differences within a country. Thus, despite the aggregate benefits that openness to international trade and a greater market orientation are expected to bring, there remains the theoretical possibility that inequality is widened as a result.

Nearly two decades after the introduction of market-oriented economic reforms in India, the consequences of these reforms for inequality are being vigorously debated, with different empirical studies reaching different conclusions concerning the evolution of inequality subsequent to the reforms. For instance, Bhalla's (2003) study of inequality trends between 1983 and 1999 concludes that "the claim that inequality has worsened" over this time period is "somewhat erroneous," while Singh et al. (2003) find evidence of modest increases of regional and within-state inequality.⁴

One reason behind these equivocal findings is that the different studies that have examined inequality have studied quite different sample aggregates. For instance, Bhalla (2003) examines within-state inequality in rural and urban areas separately while Singh et al. (2003) study the overall within-state inequality without separately considering the rural and urban components. Comparing inequality measures using data obtained at different levels of aggregation is especially problematic as the

⁴ For comparative discussions of the evolution of inequality subsequent to the reforms and prior to the 1999-2000 period survey of household incomes by the Indian National Sample Survey, see Pal and Ghosh (2007) and Panagariya (2008, Chapter 8).

inequality measures used in the vast majority of inequality studies, such as the Gini coefficient, are subject to the disadvantage that they are not additive across sub-groups. For instance, the total Gini coefficient of a society is not equal to the sum of the Gini coefficients for its sub-groups.

Our interest is in the evolution of total inequality as well as inequality within and across sub-groups (such as states or urban and rural areas within states). It would therefore be desirable to use an inequality index that is additively decomposable, i.e., it can be neatly expressed as the sum of across-group inequality and within-group inequality. Conceptually, the across-group component would be the value of the inequality index when all within group inequalities were zero due to the hypothetical assignment of the group average to each member of the same group. Similarly the within-group component would be the value of the inequality index when all the across-group inequalities are suppressed by a hypothetical equalization of group means to the overall mean (by the equi-proportionate change for every unit within each of these groups). The particular measure of inequality that we will use is Theil's entropy index, which, as is well known, is characterized by its property of additive decomposability.⁵ Furthermore, as we will discuss, the Theil index has less stringent data requirements and is particularly useful when only group data are available rather than individual data or when individual data are subject to random measurement error (which average out in larger samples). The Theil index enables us to explore in a consistent manner the evolution of inequality over different levels of aggregation.

This paper measures inequality using Theil's inequality index constructed using Indian household expenditure survey data from 1988-2005. Our findings are as follows. The extent of inequality between states or between urban and rural areas is much lower than the inequality across households within these aggregates, which accounts for more than eighty percent of overall inequality and persists in this

⁵ See Conceição and Ferreira (2000) for a detailed exposition of the theoretical and practical merits of the Theil index over other indices measuring income inequality.

magnitude throughout the period of our study. Overall inequality shows some variation over the period, rising between 1988 and 1994 and again between 1994 and 2000, but falling by 2005 to roughly the pre-reform level. Furthermore, in the post reform period (between 1994 and 2005), inequality fell in most Indian states, with rural areas in most states and urban areas in about half the states experiencing a statistically significant reduction in inequality. The change in inequality across households within states is found to uncorrelated with the change in state-level measures of tariff and non-tariff protection.

The rest of the paper proceeds as follows. Section 2 describes the data that we use in our paper. Section 3 describes the Theil Index and its use in inequality measurement. Section 4 presents results on inequality and its association with international trade. Section 5 concludes.

2. Data

2.1 Consumer Expenditure Surveys

The Indian National Sample Survey (NSS) is the primary source of information on household level expenditures in India. The NSS provides household level information on expenditure patterns, occupation, industrial affiliation (at the 3-digit NIC level) and various other household and individual characteristics. The surveys cover all Indian states, with urban and rural areas within states identified separately. Data are collected on about 75,000 rural and 45,000 urban households. Furthermore, the surveys indicate the sub-state or “region” within which the surveyed households are located. NSS regions typically consist of several districts within a state, with similar agro-climatic conditions and socio-economic features. For our analysis, we use data from the 1987-88, 1993-94, 1999-2000 and 2004-05 rounds of the NSS.

The household expenditure surveys conducted by the NSS contain detailed information on consumption expenditures undertaken by the household. The surveys include information on food consumption, non-food consumption on items such as energy and transportation, consumer durables expenditures and housing.

The monetary estimates of total consumption for a household must be adjusted to reflect the different prices that different households face. The price variations that we are concerned with are less temporal than spatial: people who live in different parts of the country pay different prices for comparable goods. For example, prices tend to be lower in rural than in urban areas, at least for some goods and services. Such spatial differences can be quite large in both absolute and relative prices and so it is important to take them into account. In our analysis, we use household-level price data (obtained from the NSS consumption surveys) on a core set of consumption items (food items and energy) to determine a price index which is then used to deflate household expenditures to make them comparable across households. Specifically, our price index (Paasche) is constructed as a weighted sum of price ratios of different commodities:

$$P^h = \left[\sum_k w_k^h \left(\frac{p_k^0}{p_k^h} \right) \right]^{-1},$$

where k denotes commodities, p^h denotes the price faced by household h , p^0 denotes the reference price, chosen to be the median price for the commodity in our sample and w_k^h , the weight, is the share of each household's budget that is devoted to the particular good. Clearly the budget shares vary across households, implying a different weighting of the price ratios for each household. But, as Deaton and Zaidi (2002) argue, this formulation better reflects welfare changes than an index that uses the same weights across households (such as the Laspeyres index).

One final point regarding the data on household consumption merits mention. As Deaton (2003) and others have noted, the design of the NSS survey questionnaire for the year 1999-2000 (the 55th round) was different from that in earlier rounds raising questions regarding the comparability of the data from this survey with previous surveys. The comparability problem arises because the 55th round of the NSS required households to report their expenditure levels over different recall periods than the previous rounds.⁶

To account for the effect of the discrepancy in recall periods, we implement the solution suggested by Deaton (2003). Specifically, we exploit the fact that there were a subset of goods (accounting for more than twenty percent of consumer expenditures) for which the survey questionnaire had the same recall period (30 days) across all rounds of the NSS and the expenditure on which is highly correlated with total expenditure. Assuming that the Engel curve relating the logarithm of expenditures per-capita on 30-day goods to the logarithm of total household expenditures per capita is stable over time, the total expenditures of the households can be backed out of expenditures on the 30-day goods. While the validity of this assumption cannot be checked, Deaton (2003) confirms the robustness of the adjustment procedure.

2.2 Trade Protection

We use Hasan, Mitra, and Ural's (2007) data on state-level measures of trade protection. In particular, industry-level tariff rates and non-tariff barrier (NTB)

⁶ More specifically, as Deaton (2003) notes, the issue is as follows: The 55th Round differed both from earlier rounds and from either of the Schedules in the experimental rounds. For the high frequency items, households were asked to report their expenditures for both recall periods. The questionnaires were printed with the list of goods down the leftmost column, with the next four columns requesting quantities and expenditures over the last seven days and over the last 30 days respectively. Such multiple reporting periods are often used in household expenditure surveys, and may well produce excellent estimates in their own right. But the results are unlikely to be comparable with those from a questionnaire in which only the 30-day questions are used. For example, when they are asked both questions, respondents are effectively being prompted to reconcile the rates of consumption across the two periods. Indeed, there is some evidence that is consistent with this sort of reconciliation.

coverage rates for agricultural, mining, and manufacturing industries are weighted by state- and sector-specific employment shares as follows:

$$Tariff_{it} = \sum_k \gamma_{ik,1993} * Ind_Tariff_{kt}$$

$$NTB_{it} = \sum_k \gamma_{ik,1993} * Ind_NTB_{kt}$$

where $\gamma_{ik,1993}^j$ is the employment share of industry k in state i derived from the 1993 employment survey. Ind_Tariff_{kt} and Ind_NTB_{kt} are industry specific tariff rates and non-tariff coverage rates that are measured at the 2-digit level for each year t .

3. Measuring Inequality

We measure inequality using Theil's "T" statistic, which, when used in the context of individual data, is given by:⁷

$$T = \sum_{p=1}^n \left\{ \left(\frac{1}{n} \right) * \left(\frac{c_p}{\mu_c} \right) * \ln \left(\frac{c_p}{\mu_c} \right) \right\}$$

where n is the number of individuals in the population, c_p is the real consumption of the person indexed by p , and μ_c is the population's average consumption. If every individual has exactly the same consumption level, T will be zero; this represents perfect equality and is the minimum value of Theil's T . If one individual has all of the consumption, T will equal $\ln(n)$; this is the highest level of inequality and is the maximum value of Theil's T statistic.

⁷ Our discussion in this section of Theil index methodology is based on the more detailed description of the Theil index and its use provided by Conceição and Ferreira (2000).

If members of a population can be divided into mutually exclusive and completely exhaustive groups, then Theil's T statistic is made up of two components, the between-group element (T^b_g) and the within-group element (T^w_g).

$$T = T^b_g + T^w_g$$

When aggregated data is available instead of individual data, T^b_g can be used as a lower bound for the population's value of Theil's T statistic. The between group element of Theil's T can be written as:

$$T^b_g = \sum_{i=1}^m \left\{ \left(\frac{p_i}{P} \right) * \left(\frac{c_i}{\mu} \right) * \ln \left(\frac{c_i}{\mu} \right) \right\}$$

where i indexes the groups, p_i is the population of group i , P is the total population, c_i is the average consumption in group i , and μ is the average consumption across the entire population. T^b_g is bounded above by the natural logarithm of the total population divided by the size of the smallest group (a value that is attained when the smallest group consumes all the resources).

As Conceição and Ferreira (2000) note, when data are hierarchically nested (e.g., every district is in a state and each state is in a country), Theil's T statistic must increase or stay the same as the level of aggregation becomes smaller (i.e., $T_{\text{population}} > T_{\text{state}} > T_{\text{district}}$). Theil's T statistic for the population equals the limit of the between group Theil component as the number of groups approaches the size of the population.

The additive decomposability of our inequality index, which allows us to neatly express inequality as the sum of between-group inequality and within-group inequality enables us to examine inequality at different levels of aggregation in our study. Furthermore, the Theil index has less stringent data requirements and is

particularly useful when only group data are available rather than individual data or when individual data are subject to random measurement error (which average out in larger samples). In our case, inequality measures may be biased by the infrequent household consumption of durable goods or other lumpy expenditures (such as on weddings and funerals). As we will discuss in greater detail, we will sometimes group households into centiles and use consumption levels averaged across different centiles of the sample to construct the Theil index, thus exploiting the advantages of using the Theil index with aggregated data.

4. Results

We use household survey data from four NSS rounds—1987-88, 1993-94, 1999-2000 and 2004-05—to construct measures of per capita expenditure inequality that may be compared over time and which, exploiting the decomposability of the Theil index, convey information about the contribution of the different sub-national aggregates (states and urban and rural areas within states) to overall inequality. Since the Theil index is sensitive to a changing number of sub-groups (and thus a changing number of households in the sample), comparability of inequality over time requires that we work with aggregated groupings of the data while fixing the number of sub groups. Thus, we aggregate household expenditures into centiles within each sub-group. This also allows us to smooth consumption of durables and other lumpy expenditures and to also smooth out any random measurement error in the survey data. We present here results using only data on expenditures on non-durable goods (food items, energy and transportation, education, medical and housing). Additional findings, not reported here, for overall consumption expenditures (including durables good consumption) are very similar to the findings presented below.

4.1 Inequality Overall

We compute first the values of the Theil index using a hierarchical breakdown where overall inequality is the sum of inequality between states and inequality within states, with the latter itself being the sum of inequality between urban and rural areas (within each state) and the inequality within urban and rural areas. Note that in order to compare the evolution of inequality over time, we now use a fixed number of final elements in urban and rural areas, by separating households into fifty percentile groups within urban areas and into fifty percentile groups in rural areas.

Figure 1A reveals an interesting pattern in the data. Inequality rises after the implementation of the economic reforms until 2000 but falls back by 2005 to roughly the 1988 level. Figure 1B provides the decomposition of overall inequality into inequality across states, across urban and rural areas within states and across percentile groups within these urban and rural aggregates. Clearly, most of the inequality lies at a level below that of the urban/rural or state aggregates. Indeed, inequality between states and inequality between urban and rural areas within states jointly account for less than thirty percent of overall inequality in all years except the year 2000.

To evaluate the statistical significance of the inequality trends discussed in the preceding paragraph, we obtain bootstrapped estimates of the sampling variances associated with the inequality estimates. This is done using the methodology suggested and implemented in the statistical package STATA by Jolliffe and Krushelnysky (STATA command *ineqerr*). Figure 1C presents inequality trends with the associated standard errors. Specifically, the chart indicates the inequality estimate along with a two standard deviation height (reflecting a 95 percent confidence interval) marked above and below this mean estimate. It should be clear from Figure 1C that while the increase in inequality between 1988 and 1994 and

between 1988 and 2000 is statistically significant, the level of inequality in 1988 is not statistically different from its level in 2005. Thus, taking into account sampling variances only confirms the evolution of inequality trends pictured in Figure 1A.

Finally, we compute the values of the Theil index and the contribution of the sub-national aggregates using households themselves (rather than household centiles) as the most disaggregated elements in the nested hierarchy. Note that since the number of households is changing over time, we may not directly compare the values of the Theil index computed in this fashion over time. However, by using households themselves as the most disaggregated elements in the construction of the index, we can achieve a finer decomposition of overall inequality. Figure 2 again presents the decomposition of overall inequality into inequality across states, across urban and rural areas within states and across households within these urban and rural aggregates. Most of the inequality lies at a level below that of the urban/rural or state aggregates. A more detailed decomposition is presented in Figure 3, where inequality within urban and rural aggregates (within states) is now decomposed into inequality across different first-stage units (FSUs) that are either villages or collections of urban blocks and inequality across households within FSUs. As Figure 3 indicates, more than fifty percent of the overall inequality is accounted for by inequality across households within FSUs, with significant inequality also between FSUs within urban and rural aggregates. Consistent with Figure 2, most of the inequality is observed below the urban and rural aggregates within states.

4.2 Inequality across States

Figures 4A and 4B provide a slightly different decomposition of inequality, where overall inequality is constructed as the sum of inequality between states and inequality within states. Figure 4A presents the evolution of overall inequality and Figure 4B presents the decomposition. While the quantitative measure of overall inequality presented in Figure 4A is not directly comparable to the inequality measure presented in Figure 1A (as the hierarchical nesting of sub-groups has

changed), the evolution of overall inequality in Figure 4A is similar to that presented in Figure 1A. Specifically, inequality rises between 1988 and 2000 and then falls back in 2005 to roughly the pre-reform level in 1988. The decomposition of inequality into elements between and within states again indicates that as wide as is the gap in per capita expenditures between Indian states, inequality across household centiles within states is much larger, with the latter accounting for more than eighty percent of overall inequality in all years other than the year 2000, when it rises a bit above twenty percent. Figure 4C which includes estimates of the associated (bootstrapped) standard errors, again confirms the statistical significance of the inequality patterns indicated in Figure 4A.

4.3 Inequality between Urban and Rural Areas

Figures 5A and 5B provide a yet different decomposition of inequality, where now overall inequality is constructed as the sum of inequality between urban and rural areas and across households within these areas. Figure 5A presents the evolution of overall inequality and Figure 5B presents the decomposition. While, again, the quantitative measure of overall inequality presented in Figure 5A is not directly comparable to the inequality measures presented in Figures 1A or 4A, the evolution of overall inequality in Figure 5A is similar to that presented in Figures 1A and 4A. Once again, inequality rises between 1988 and 2000 and then falls back in 2005 to about the pre-reform level in 1988. The decomposition of inequality into elements between and within urban and rural areas in Figure 5B tells us that much of the inequality seen here is inequality across household centiles, which accounts for more than eighty percent of overall inequality.

4.4 Inequality within States

Table 1 presents within-state inequality measures calculated for each state—overall and separately for urban and rural areas. We note first that the inequality ranking of states is quite similar, although not identical, to the inequality rankings (measured

using the variance of log incomes) reported by Deaton and Dreze (2002). Thus, for rural inequality in 1994, the states of Maharashtra, Tamil Nadu, Andhra Pradesh, Kerala and Punjab appear in the top third of the group in Table 1, with the highest levels of rural inequality, while Assam, Bihar, Orissa, Jammu and Kashmir appear within the bottom third, with the lowest levels of rural inequality, just as in Deaton and Dreze (2002). For urban areas, again as in Deaton and Dreze (2002), Tamil Nadu, Kerala, Himachal Pradesh and Andhra Pradesh appear within the top third of the group while Rajasthan, Jammu and Kashmir and Assam appear within the bottom third.⁸

Turning to changes in inequality, we can see from Table 1 that overall inequality fell between 1994 and 2005 in the vast majority of states. Only Manipur and Nagaland show significant increases in inequality, with two additional states, Madhya Pradesh and Tamil Nadu indicating smaller, but statistically significant increases in inequality. In rural areas, again, only Manipur, Nagaland and, to a smaller extent, Sikkim indicate increases in inequality, with the vast majority of states indicating a reduction in inequality between 1994 and 2005. Finally, urban areas in about half the states (notably including the northeastern states -- Arunachal Pradesh, Manipur, Mizoram, Nagaland and Sikkim, but also other states such as Andhra Pradesh, Madhya Pradesh and Tamil Nadu) indicate statistically significant increases in inequality over this period, with about half the states indicating a decline in inequality instead.

4.5 Distribution of Consumption Expenditures

To study in greater detail the evolution of the overall level of inequality reported in Section 4.1, we examine next the changes in the centile distribution of log per capita

⁸ We should note that the Deaton and Dreze (2002) study reported inequality estimates for 15 states in contrast to the 25 reported on in Table 1. Our comparison of inequality rankings with those reported in Deaton and Dreze (2002) is therefore just an indicative one. We should also note that a major exception is Punjab which indicates reasonably high levels of urban inequality in our study while appearing at the bottom of the list in Deaton and Dreze (2002).

expenditure shares over the time period 1988-2005. Figures 6A, 6B , 6C and 6D illustrate the changes in real per capita consumption expenditure shares of each percentile group across the years 1988-1994, 1994-2000, 2000-2005 and across the full period 1988-2005 respectively. Figure 6A, spanning the initial reform period, clearly indicates an increase in inequality in 1994 relative to 1988, with the share of the lower percentiles falling while the middle and higher percentile groups increased their share. The period 1994-2000, represented in Figure 6B indicates the rising (relative) importance of the “middle classes” whose consumption shares rose while the consumption shares of the lower percentile groups and the highest percentile groups both fell. Figure 6C, representing the period 2000-2005, suggests a significant recovery by the lower percentile groups and a clear pattern of falling inequality over this period. The change in consumption shares across the full period 1988-2005, presented in Figure 6D, illustrates the much talked about story concerning the rise of the Indian middle classes in recent decades. Combined with the fall in consumption shares of both the lowest and highest percentile groups, it also explains our finding in Section 4.1 concerning the lack of a significant change in Theil inequality between the beginning and end points of our study.

4.6 Trade Openness and Inequality

We turn, finally, to the links between exposure to international trade and inequality. Our analysis is conducted at the level of the state. As discussed in Section 2.2, we use measures of tariff and non-tariff protection constructed by Hasan, Mitra and Ural's (2007). Specifically, the state level measures for protection are constructed by using industry-level tariff rates and non-tariff barrier (NTB) coverage rates for agricultural, mining, and manufacturing industries, weighted by state and sector specific employment shares.

Figure 7 plots the changes in inequality within states over the time period 1988-2005 against changes in state level tariff protection between 1988 and 1994. No pattern can be discerned between the magnitude of tariff reductions and the

changes in inequality. Figure 8 plots the changes in inequality within states (for the time period 1988-2005) against changes in state level non-tariff protection between 1988 and 1994. Once again, there is no clear pattern that can be discerned in the data.

Nevertheless, to test formally for the presence of a statistically significant association between changes in inequality and trade policy changes, we examine regression estimates from the following econometric specifications:

$$\Delta Inequality_{2004-1988} = \alpha + \beta(\Delta Tariff_{1994-1988}) + \varepsilon$$

and

$$\Delta Inequality_{2004-1988} = \alpha + \beta(\Delta NTB_{1994-1988}) + \varepsilon$$

Table 2 presents the results from ordinary least squares (OLS) estimation of the specifications above. As suggested by the scatter plots in Figures 7 and 8, OLS estimates of the parameter β measuring the association between changes in inequality and trade policy changes are insignificantly different from zero.⁹

The finding of the lack of any significant association between trade openness and inequality is robust to many changes to the econometric specification we have considered above. Specifications involving levels rather than differences of the dependent and independent variables and the use of different lag structures all yield essentially the same outcome, a statistically insignificant association between trade openness and inequality. Furthermore, considering income inequality changes over different time periods (such as between 1988 and 1994) rather than the 1988-2005 period and focusing separately on urban and rural inequality do not alter the results in any way. Thus, the hypothesis of an association between trade and inequality does not find support in our analysis of the data.

⁹ Kerala, an outlier state due to the magnitude of the change in its trade barriers, has been dropped from these figures.

5. Conclusions

The consequences of the economic reforms in India for inequality have been vigorously debated. To study the evolution of inequality subsequent to the economic reforms, we have used the Theil inequality index constructed using household expenditure data from the Indian National Sample Survey. As we have discussed in this paper, the Theil index has the merit that it is additively decomposable so that it can be expressed as the sum of across-group inequality and within-group inequality, thereby enabling a consistent examination of inequality at different levels of aggregation.

Our main findings are that overall inequality varied only modestly over the period of our study, rising slightly between 1988 and 1994 and again between 1994 and 2000, but falling by 2005 to roughly the pre-reform level. Furthermore, in the post reform period (between 1994 and 2005), inequality fell in most Indian states, with rural areas in most states and urban areas in about half the states experiencing a statistically significant reduction in inequality. The change in inequality across households within states is found to be uncorrelated with the change in state-level measures of tariff and non-tariff protection. Considered alongside the evidence concerning the reduction in poverty in this time period, our findings should allay concerns regarding the adverse impact on equity of the economic reforms undertaken in India.

References

Atkinson, A. B., 1983, *The Economics of Inequality*, Second Edition, Oxford University Press, New York, NY

Bhagwati, J., 2005, *In Defense of Globalization*, Oxford University Press, New York, NY

Bhagwati, J., 1993, *India in Transition: Freeing the Economy*, Oxford University Press (Clarendon), New York

Bhalla, S., 2003, Recounting the Poor: Poverty in India, 1983-1999, *Economic and Political Weekly*, Volume 38, Number 4, pp 338-349.

Conceição, P., and Ferreira, P., 2000, "The Young Person's Guide to the Theil Index: Suggesting Intuitive Interpretations and Exploring Analytical Applications", University of Texas Inequality Project (UTIP), Working Paper Number 14.

Deaton, A., and Dreze, J., 2002, Poverty and Inequality in India: A Re-Examination, Center for Economic Development, Working Paper Number 107, Princeton University,

Deaton, A. and Zaidi, S., 2002, "Guidelines for Constructing Consumption Aggregates for Welfare Analysis", *Living Standards Measurement Study*, Working Paper Number 135, World Bank, Washington DC

Deaton, A., and Dreze, J., 2003, "Adjusted Poverty Estimates for India for 1999-2000", *Economic and Political Weekly*, Volume 38, Number 4, pp 322-326.

Hasan, R., Mitra, D., and Ural, B., 2007, Trade Liberalization, Market Institutions and Poverty Reduction, India Policy Forum, Brookings Institution, Volume 3, pp 71-110.

Hnatkovska, V., Lahiri, A., and Paul, S., 2010, Castes and Labor Mobility, *Working Paper*, University of British Columbia.

Jalan, J., and R. Murgai, 2009, Intergenerational Mobility in Education in India, *Working Paper*, Indian Statistical Institute, Delhi.

Kuznets, S., 1953, *Share of Upper Income Groups in Income and Savings*, National Bureau of Economic Research, New York

Munshi, K., and Rosenzweig, M., Why is Mobility in India so Low? Social Insurance, Inequality, and Growth, *Working Paper*, Brown University, Department of Economics.

Pal, P., and Ghosh. J., 2007, "Inequality in India: A Survey of Recent Trends", United Nations, Department of Economic and Social Affairs, Working Paper Number 45, New York

Panagariya, A., 2008, *India: The Emerging Giant*, Oxford University Press, New York, NY

Singh, N., Bhandari, L., Chen, A., and Khare., A., 2003, "Regional Inequality in India: A Fresh look", *Economic and Political Weekly*, Volume 38, Number 11, pp 1069-1073.

Figure 1A

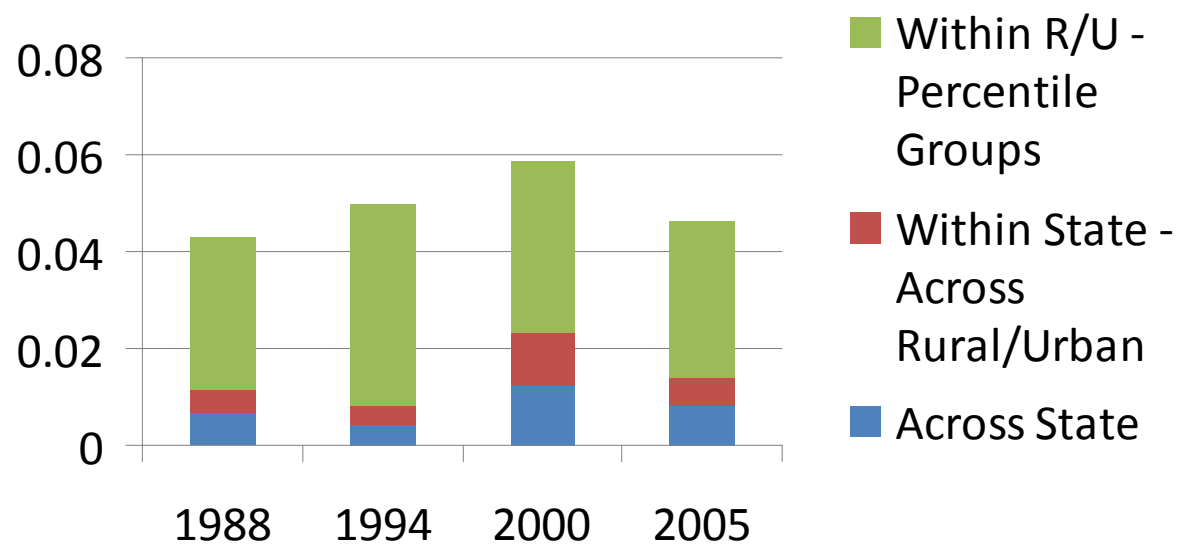


Figure 1B

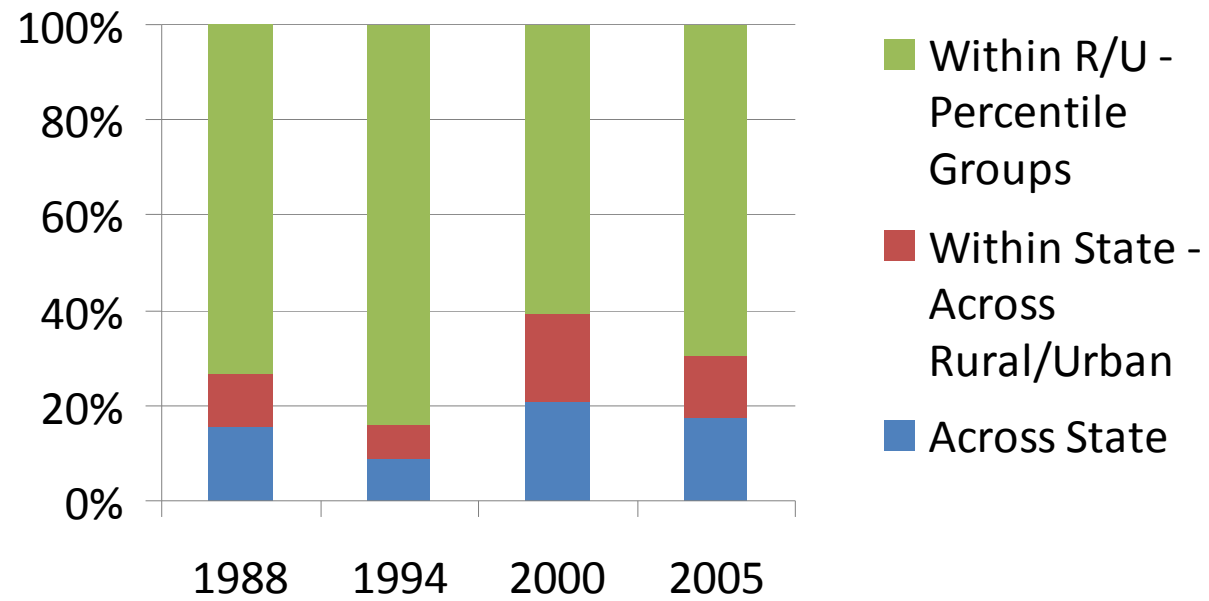


Figure 1C

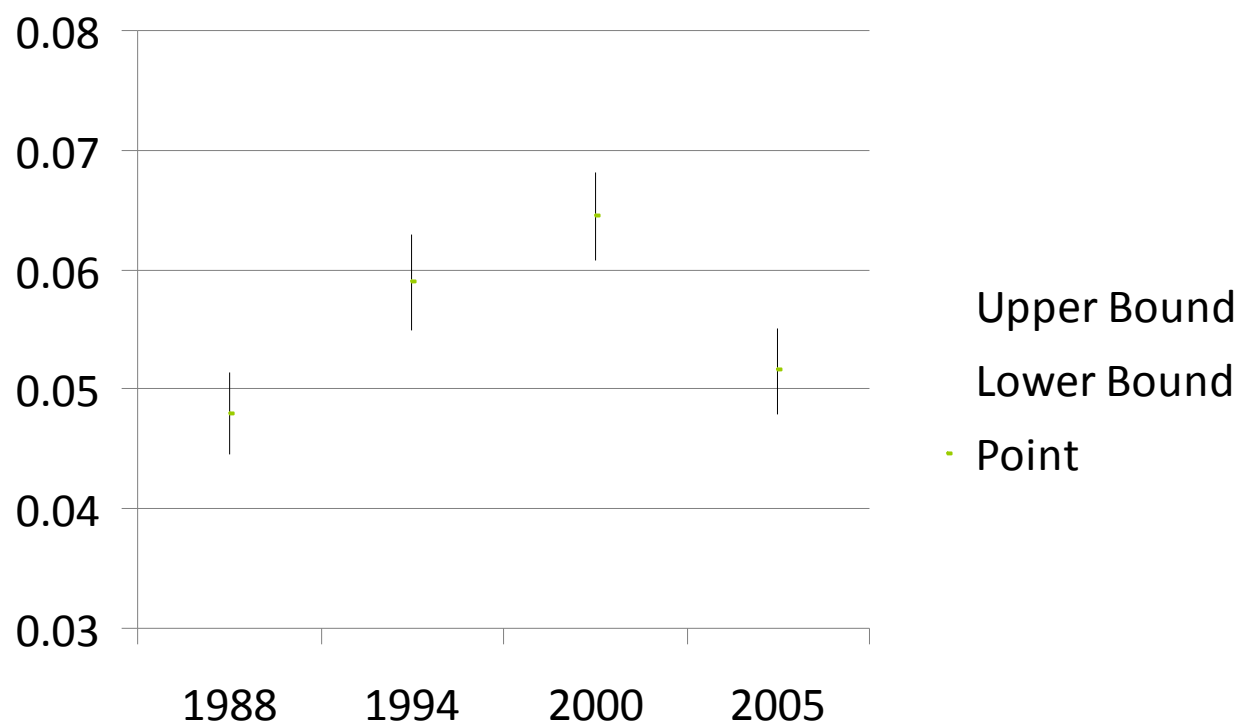


Figure 2

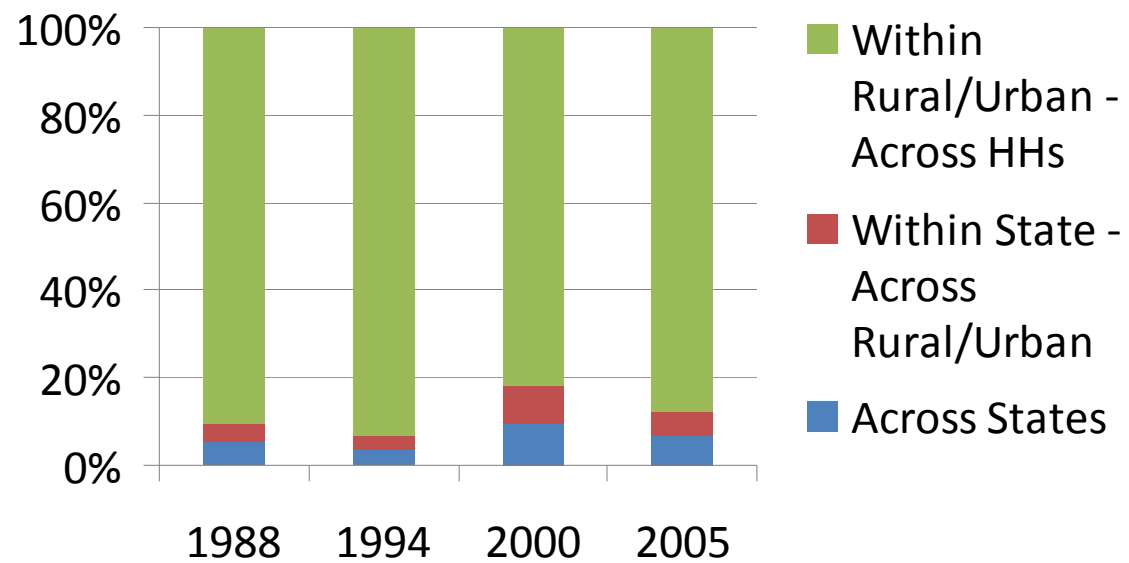


Figure 3

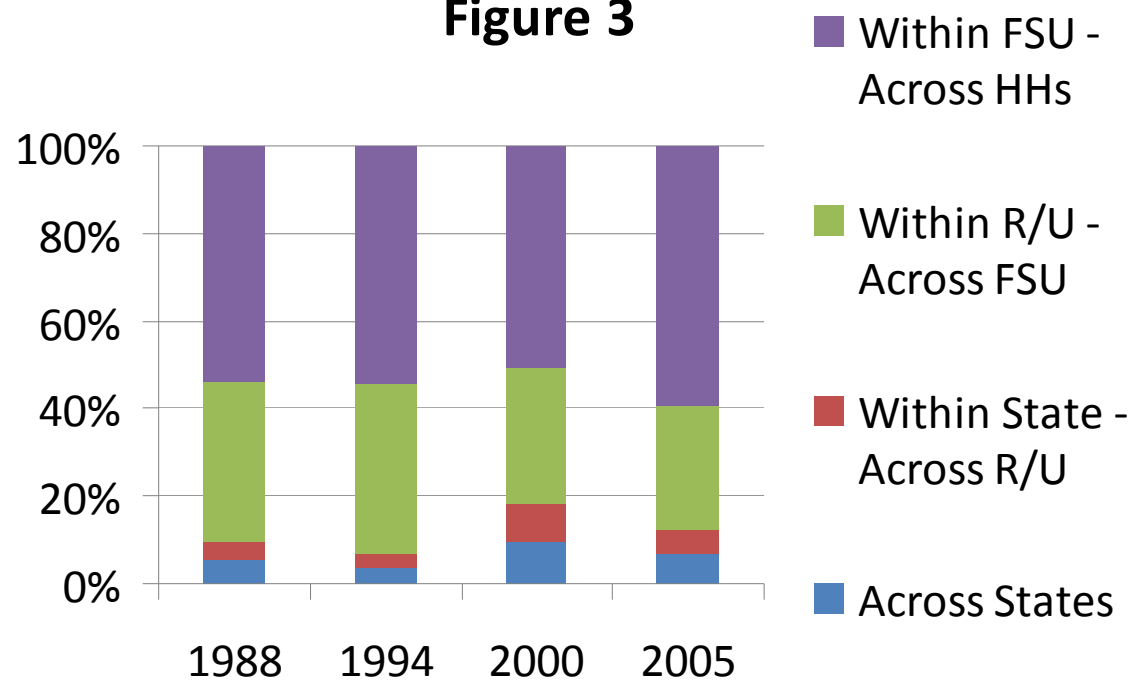


Figure 4A

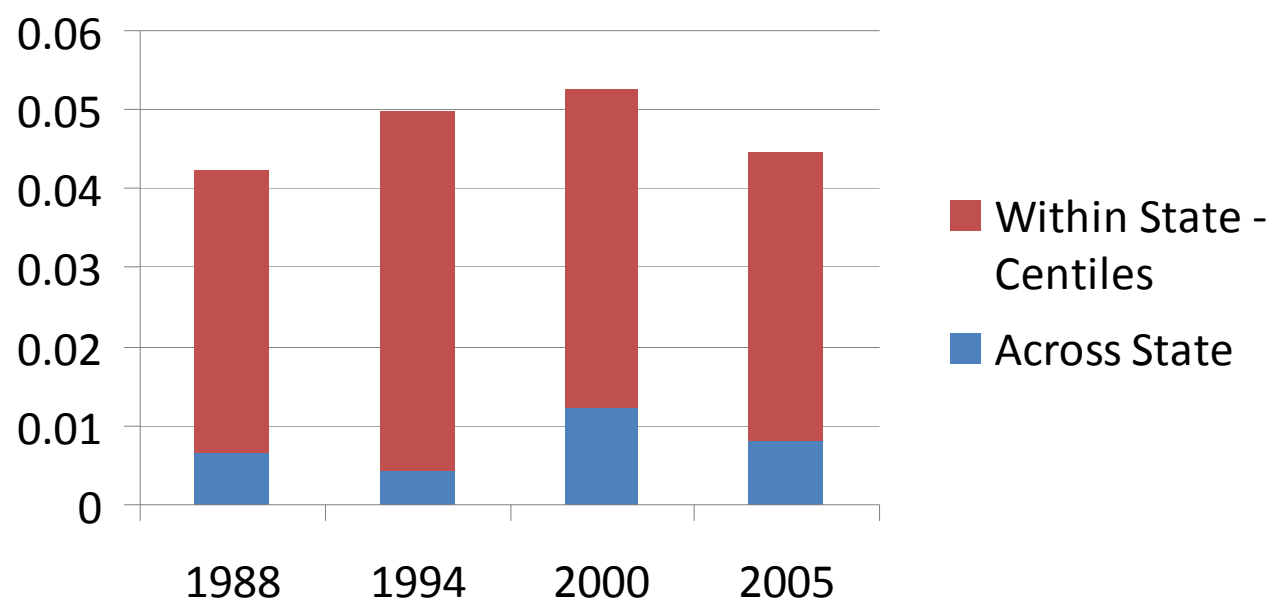


Figure 4B

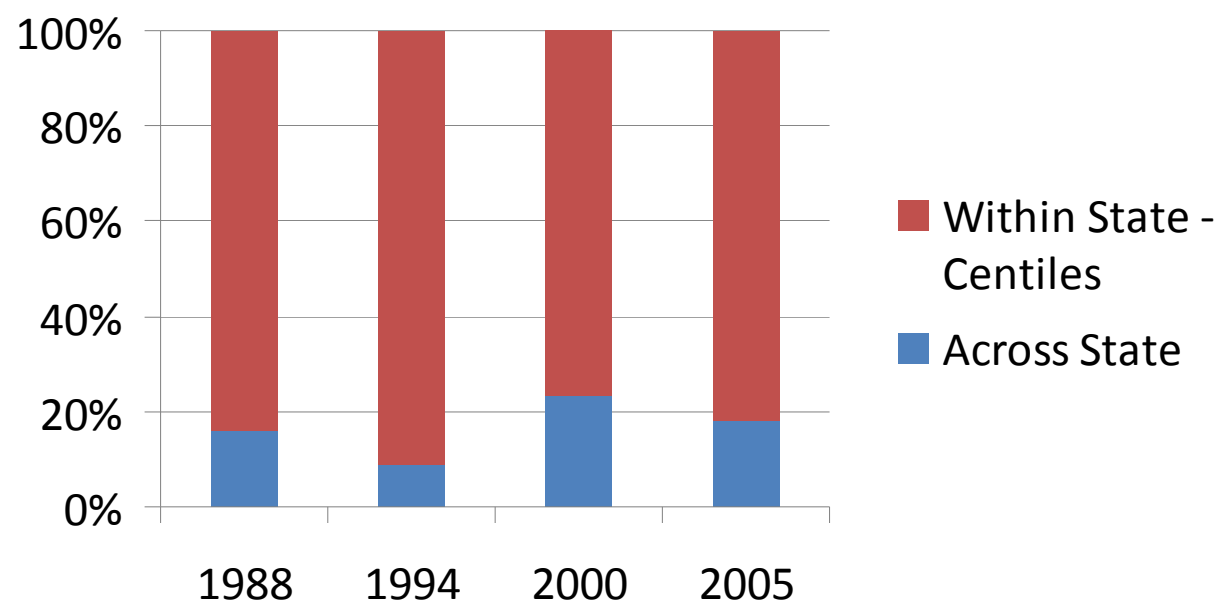


Figure 4C

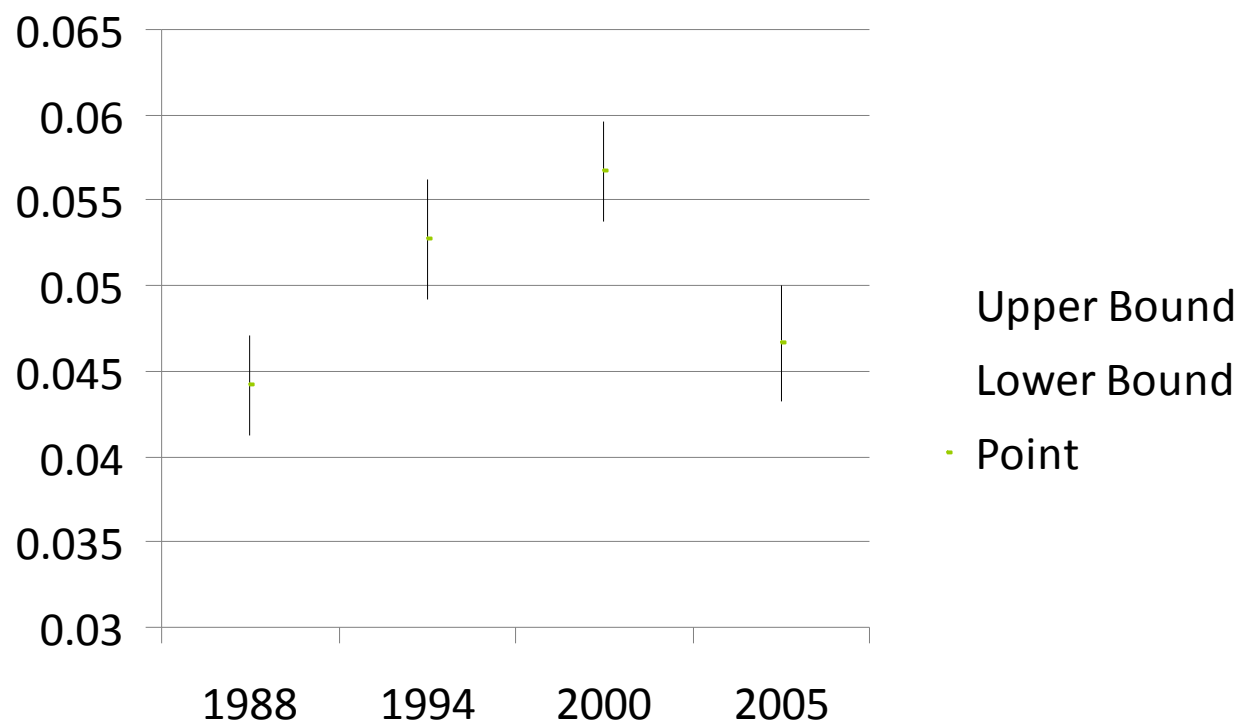


Figure 5A

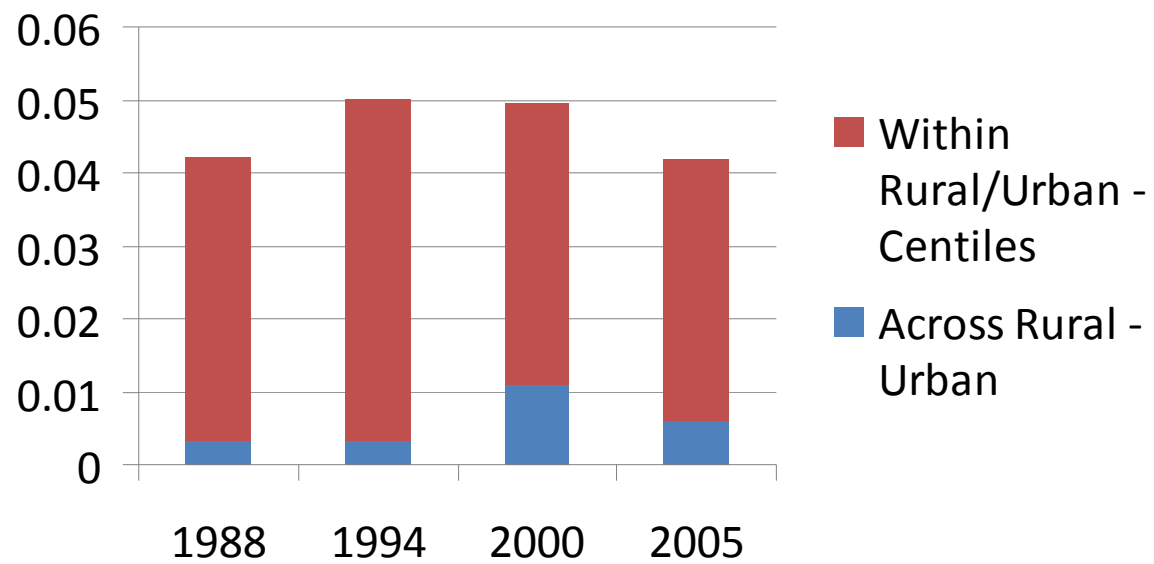
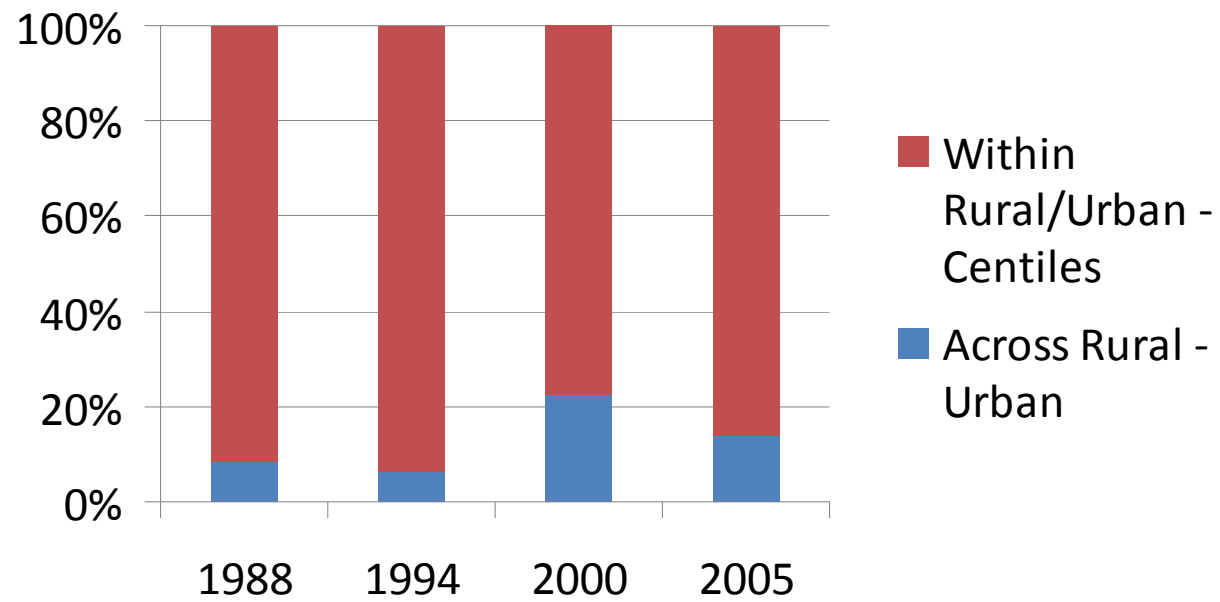


Figure 5B



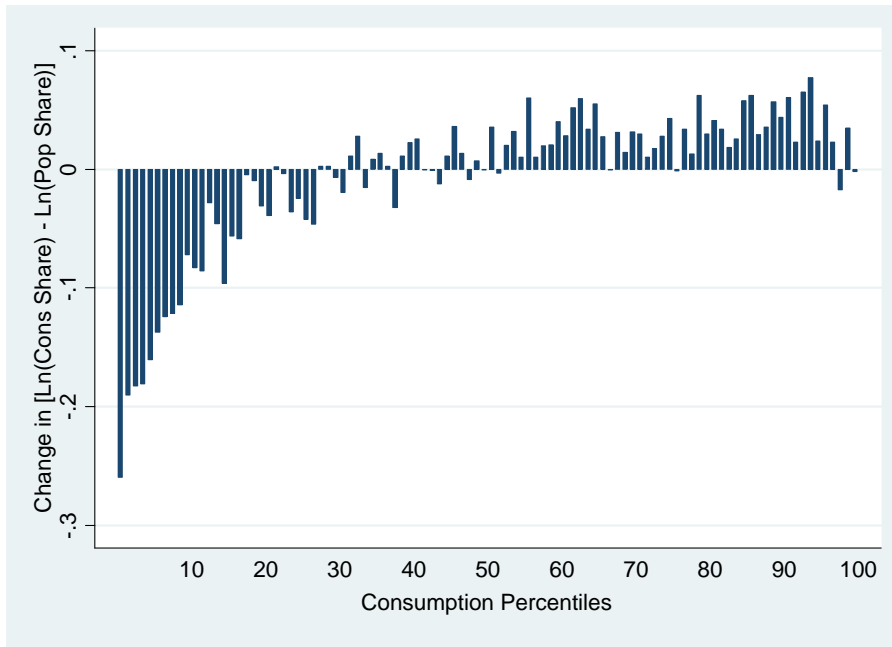


Figure 6A: 1988-1994 - Change in Log Per Capita Consumption Shares

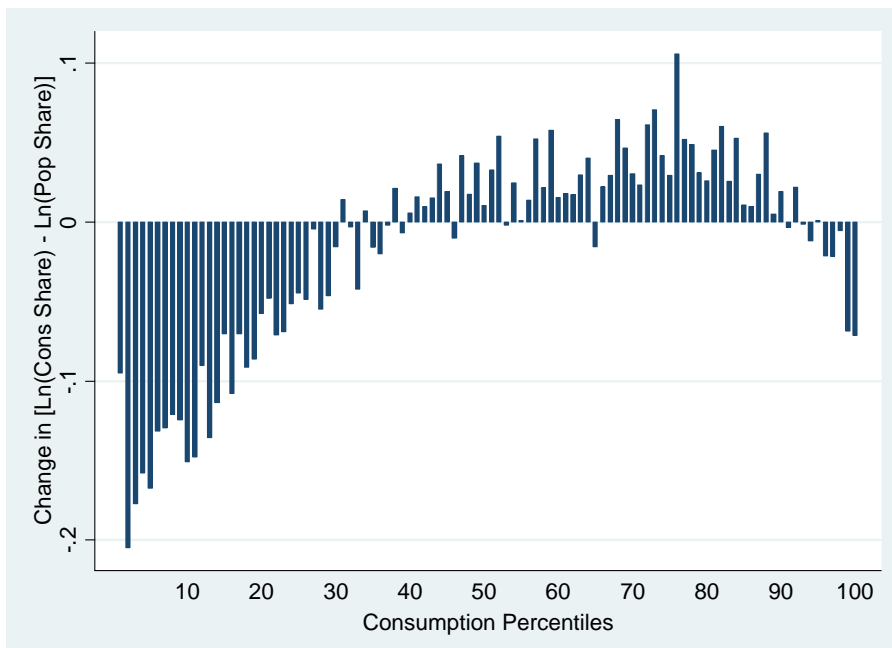


Figure 6B: 1994-2000 - Change in Log Per Capita Consumption Shares

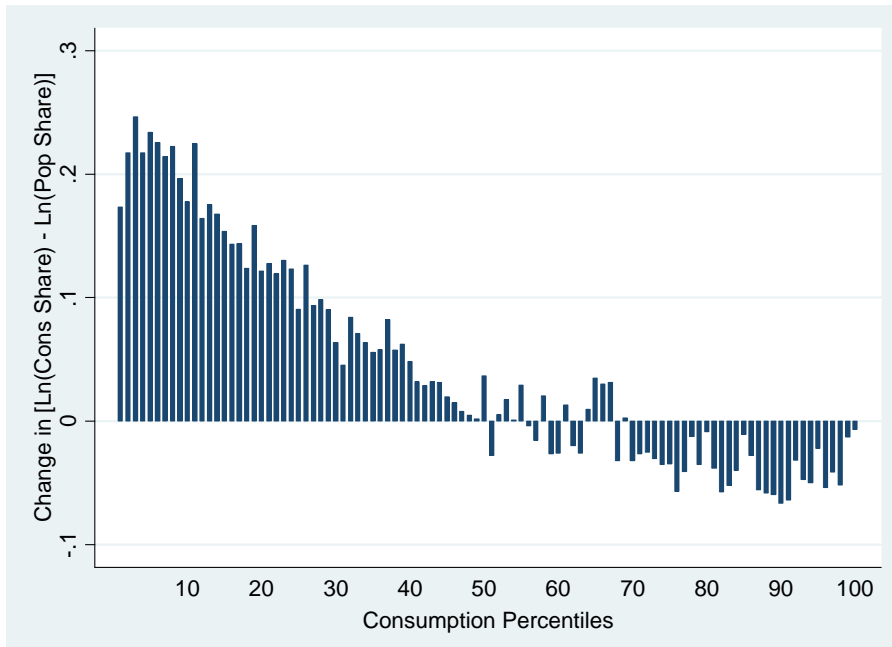


Figure 6C: 2000-2005 - Change in Log Per Capita Consumption Shares

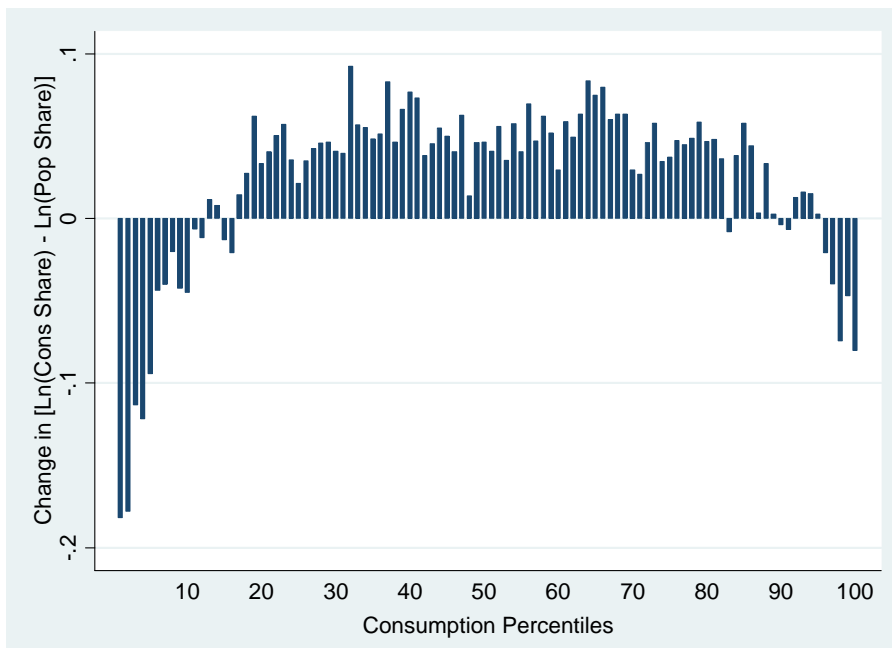


Figure 6D: 1988-2005 - Change in Log Per Capita Consumption Shares

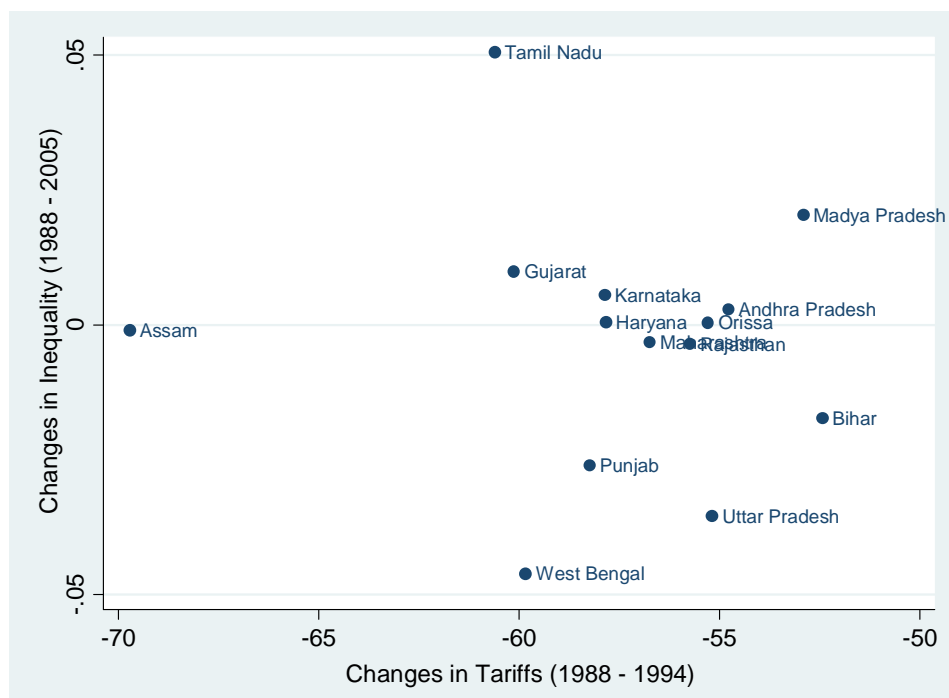


Figure 7: Changes in Inequality and Tariff Protection

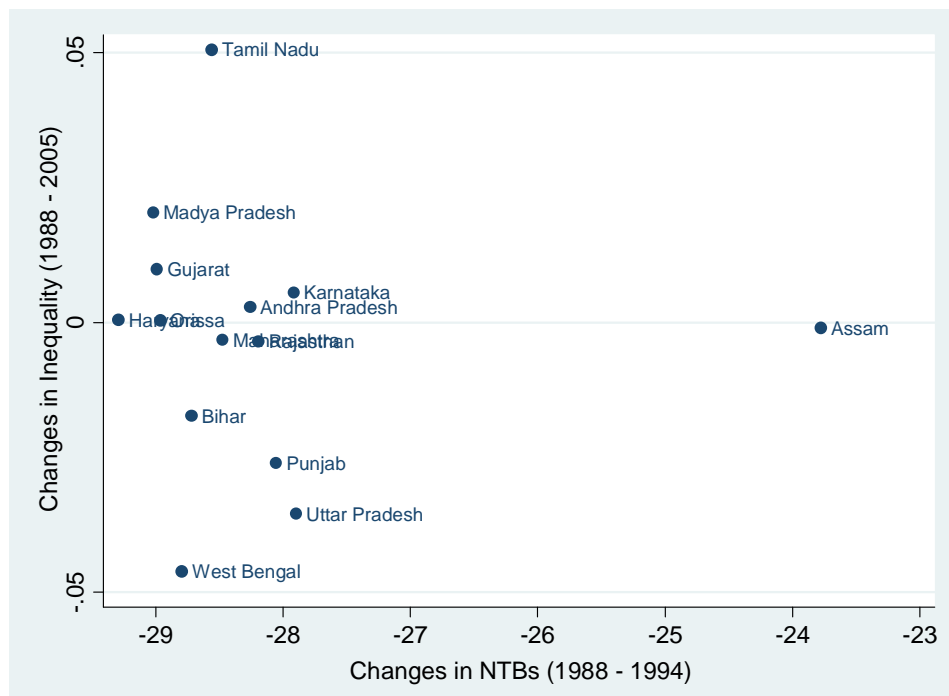


Figure 8: Changes in Inequality and Non Tariff Protection

Table 1: Evolution of Theil Index Inequality within States (1988-2005)

States	Overall				Rural				Urban			
	1988	1994	2000	2005	1988	1994	2000	2005	1988	1994	2000	2005
Andhra Pradesh	0.053	0.073	0.052	0.056	0.054	0.076	0.042	0.043	0.052	0.066	0.041	0.071
Arunachal Pradesh	0.037	0.078	0.062	0.063	0.040	0.085	0.054	0.055	0.033	0.053	0.092	0.088
Assam	0.027	0.037	0.043	0.026	0.024	0.030	0.039	0.020	0.035	0.046	0.047	0.042
Bihar	0.044	0.037	0.043	0.027	0.041	0.034	0.039	0.018	0.036	0.039	0.047	0.041
Goa	0.030	0.095	0.061	0.091	0.032	0.105	0.072	0.067	0.028	0.081	0.053	0.095
Gujarat	0.027	0.052	0.037	0.037	0.026	0.040	0.038	0.023	0.025	0.060	0.030	0.035
Haryana	0.032	0.042	0.043	0.032	0.033	0.045	0.044	0.028	0.032	0.046	0.045	0.045
Himachal Pradesh	0.049	0.056	0.030	0.038	0.062	0.048	0.019	0.033	0.039	0.074	0.027	0.037
Jammu & Kashmir	0.069	0.033	0.020	0.022	0.074	0.028	0.018	0.020	0.059	0.040	0.021	0.028
Karnataka	0.033	0.048	0.041	0.038	0.027	0.045	0.043	0.024	0.040	0.051	0.035	0.040
Kerala	0.043	0.091	0.046	0.049	0.038	0.092	0.042	0.049	0.043	0.086	0.050	0.050
Madhya Pradesh	0.018	0.034	0.050	0.038	0.019	0.034	0.050	0.031	0.015	0.036	0.044	0.046
Maharashtra	0.049	0.050	0.046	0.046	0.028	0.051	0.038	0.033	0.043	0.047	0.033	0.044
Manipur	0.018	0.020	0.025	0.032		0.018	0.023	0.025	0.010	0.023	0.023	0.041
Meghalaya	0.032	0.040	0.030	0.014	0.031	0.037	0.021	0.008	0.033	0.035	0.018	0.016
Mizoram	0.044	0.048	0.027	0.048	0.044	0.038	0.019	0.040	0.043	0.039	0.025	0.049
Nagaland	0.025	0.026	0.019	0.036	0.024	0.026	0.020	0.033	0.027	0.027	0.019	0.032
Orissa	0.035	0.039	0.056	0.036	0.027	0.035	0.051	0.031	0.030	0.042	0.046	0.046
Punjab	0.074	0.062	0.048	0.048	0.077	0.066	0.051	0.044	0.069	0.060	0.047	0.054
Rajasthan	0.029	0.029	0.027	0.025	0.026	0.027	0.026	0.022	0.043	0.033	0.027	0.028
Sikkim	0.034	0.039	0.048	0.040	0.030	0.036	0.031	0.038	0.042	0.031	0.051	0.042
Tamil Nadu	0.036	0.080	0.075	0.087	0.032	0.075	0.066	0.063	0.045	0.080	0.060	0.086
Tripura	0.029	0.057	0.055	0.042	0.019	0.049	0.047	0.028		0.061	0.045	0.057
Uttar Pradesh	0.065	0.040	0.040	0.030	0.064	0.039	0.038	0.026	0.071	0.043	0.048	0.042
West Bengal	0.081	0.038	0.044	0.034	0.042	0.035	0.043	0.026	0.083	0.046	0.045	0.047

Table 2: Inequality and Trade Protection

Inequality Change (1988-2005)	Tariffs	NTBs
Change in Trade Protection (1988-1994)	-0.00073 (0.00110)	-0.00234 (0.00177)
Constant	-0.0396 (0.06510)	-0.0634 (0.04840)
Number of Observations	14	14
R2	0.03	0.03